

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Priority Application Serial No. 09/411,139
Priority Filing Date October 1, 1999
Inventor Warren M. Farnworth et al.
Assignee Micron Technology, Inc.
Priority Group Art Unit 2858
Priority Examiner R. Kobert
Attorney's Docket No. MI22-1703
Title: "Removable Electrical Interconnect Apparatuses and Removable
Engagement Probes"

EL 465781868

PRELIMINARY AMENDMENT

To: Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

From: James D. Shaurette (Tel. 509-624-4276; Fax 509-838-3424)
Wells, St. John, Roberts, Gregory & Matkin P.S.
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Spokane, WA 99201-3828

Sir:

Please enter the following amendments prior to examining the above-identified application.

AMENDMENTS

In the Title

Please replace the title with the following: --REMOVABLE ELECTRICAL
INTERCONNECT APPARATUSES AND REMOVABLE ENGAGEMENT PROBES--.

In the Specification

At p. 1 before the "Technical Field" section, please insert the following:

--RELATED PATENT DATA

This patent resulted from a divisional application of U.S. Patent Application Serial No. 09/411,139, filed October 1, 1999, entitled "Methods of Engaging Electrically Conductive Pads on a Semiconductive Substrate, Removable Electrical Interconnect Apparatuses, Engagement Probes and Removable Engagement Probes", naming Warren M. Farnworth et al. as inventors; which was a divisional application of U.S. Patent Application Serial No. 09/267,990, filed March 12, 1999, entitled "Engagement Probes, Removable Electrical Interconnect Apparatus and Methods of Engaging Electrically Conductive Pads on a Semiconductor Substrate", naming Warren M. Farnworth et al. as inventors; which was a divisional application of U.S. Patent Application Serial No. 08/895,764, filed July 17, 1997, entitled "Methods of Forming an Apparatus for Engaging Electrically Conductive Pads and Method of Forming a Removable Electrical Interconnect Apparatus", naming Warren M. Farnworth et al. as inventors; which was a continuation of U. S. Patent Application Serial No. 08/621,157, filed March 21, 1996, since abandoned; which was a continuation of U. S. Patent Application Serial No. 08/206,747, filed March 4, 1994, now U. S. Patent No. 5,523,697, issued June 4, 1996; which was divisional of U. S. Patent Application Serial No. 08/116,394, filed

September 3, 1993, now U. S. Patent No. 5,326,428, issued July 5, 1994; the disclosures of which are incorporated by reference.--

In the Claims

Please replace the claims with the following clean version of the entire set of pending claims, in accordance with 37 C.F.R. § 1.121(c)(1)(i).

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31. (New) A removable electrical interconnect apparatus for removably engaging electrically conductive pads on a semiconductor substrate having integrated circuitry fabricated therein, the apparatus comprising:

a substrate; and

an engagement probe projecting from the substrate to engage a single conductive pad on a semiconductor substrate having integrated circuitry formed in the semiconductor substrate, the engagement probe having an outer surface comprising an apex in the form of at least one knife-edge line sized and positioned to engage the single conductive pad.

32. (New) The removable electrical interconnect apparatus of claim 31 wherein the engagement probe is formed on a projection from the substrate.

33. (New) The removable electrical interconnect apparatus of claim 31 wherein the knife-edge line projects from a penetration stop plane.

34. (New) The removable electrical interconnect apparatus of claim 31 wherein the knife-edge line projects from a penetration stop plane, the knife-edge line having a tip and a having a base at the penetration stop plane, the tip being a distance from the penetration stop plane of about one-half the thickness of the conductive pad which the apparatus is adapted to engage.

35. (New) The removable electrical interconnect apparatus of claim 31 wherein the engagement probe is formed on a projection from the substrate, the knife-edge line projecting from a penetration stop plane on the projection.

36. (New) The removable electrical interconnect apparatus of claim 31 wherein the engagement probe is formed on a projection from the substrate, the knife-edge line projects from a penetration stop plane on the projection, the knife-edge line having a tip and a having a base at the penetration stop plane, the tip being a distance from the penetration stop plane of about one-half the thickness of the conductive pad which the apparatus is adapted to engage.

37. (New) The removable electrical interconnect apparatus of claim 31 wherein outermost portions of the electrically conductive apexes constitute a first electrically conductive material, and wherein the conductive pads for which the apparatus is adapted have outermost portions constituting a second electrically conductive material; the first and second electrically conductive materials being different.

38. (New) The removable electrical interconnect apparatus of claim 31 wherein the engagement probe is formed from a semiconductor substrate.

39. (New) The removable electrical interconnect apparatus of claim 31 wherein the knife-edge line includes an outer conductive layer.

40. (New) The removable electrical interconnect apparatus of claim 31 wherein the outer surface includes plural knife-edge lines configured to engage the single conductive pad.

41. (New) The removable electrical interconnect apparatus of claim 31 wherein the engagement probe is formed from a semiconductor substrate and the outer surface includes plural knife-edge lines configured to engage the single conductive pad.

42. (New) The removable electrical interconnect apparatus of claim 31 wherein the engagement probe is formed from a semiconductor substrate and the outer surface includes plural knife-edge lines configured to engage the single conductive pad and the knife-edge lines include outer conductive layers.

43. An engagement probe formed from a semiconductor material and having a grouping of a plurality of projecting apexes positioned is sufficient proximity to one another to collectively engage a single conductive pad on a semiconductor substrate.

44. (New) The engagement probe of claim 43 comprising a plurality of such groupings for engaging multiple conductive pads on the semiconductor substrate.

45. (New) The engagement probe of claim 43 wherein the apexes are in the shape of multiple knife-edge lines.

46. (New) The engagement probe of claim 43 wherein the apexes are in the shape of multiple knife-edge lines, the multiple knife-edge lines being positioned to form at least one polygon.

47. (New) The engagement probe of claim 43 wherein the apexes are in the shape of multiple knife-edge lines, the multiple knife-edge lines being positioned to form at least two polygons one of which is received entirely within the other.

48. (New) The engagement probe of claim 43 wherein the grouping of apexes is formed on a projection from a substrate.

49. (New) The engagement probe of claim 43 wherein the apexes have a selected projecting distance, the projecting distance being about one-half the thickness of the conductive pad which the apparatus is adapted to engage.

50. (New) The engagement probe of claim 43 wherein the apexes project from a common plane, the apexes having respective tips and bases, the bases of adjacent projecting apexes being spaced from one another to define a penetration stop plane therebetween.

51. (New) The engagement probe of claim 43 wherein the apexes project from a common plane, the apexes having respective tips and bases, the bases of adjacent projecting apexes being spaced from one another to define a penetration stop plane therebetween, the tips being a distance from the penetration stop plane of about one-half the thickness of the conductive pad which the apparatus is adapted to engage.

52. (New) The engagement probe of claim 43 wherein the apexes are in the shape of multiple knife-edge lines, the multiple knife-edge lines interconnecting to form at least one fully enclosed polygon.

53. (New) The engagement probe of claim 43 wherein outermost portions of the electrically conductive apexes constitute a first electrically conductive material, and wherein the conductive pads for which the probe is adapted have outermost portions constituting a second electrically conductive material; the first and second electrically conductive materials being different.

54. (New) A removable engagement probe having an outer surface comprising an apex in the form of at least one knife-edge line sized and positioned to engage a single conductive pad.

55. (New) The removable engagement probe of claim 54 wherein the at least one knife-edge line is formed on a projection from a substrate.

56. (New) The removable engagement probe of claim 54 wherein the knife-edge line projects from a penetration stop plane.

57. (New) The removable engagement probe of claim 54 wherein the knife-edge line projects from a penetration stop plane, the knife-edge line having a tip and a having a base at the penetration stop plane, the tip being a distance from the penetration stop plane of about one-half the thickness of the conductive pad which the apparatus is adapted to engage.

58. (New) The removable engagement probe of claim 54 wherein the knife-edge line is formed on a projection from a substrate, the knife-edge line projecting from a penetration stop plane on the projection.

59. (New) The removable engagement probe of claim 54 wherein the knife-edge line is formed on a projection from a substrate, the knife-edge line projects from a penetration stop plane on the projection, the knife-edge line having a tip and a having a base at the penetration stop plane, the tip being a distance from the penetration stop plane of about one-half the thickness of the conductive pad which the apparatus is adapted to engage.

60. (New) The removable engagement probe of claim 54 wherein outermost portions of the electrically conductive apexes constitute a first electrically conductive material, and wherein the conductive pads for which the probe is adapted have outermost portions constituting a second electrically conductive material; the first and second electrically conductive materials being different.

61. (New) The removable engagement probe of claim 54 wherein the probe is fabricated from a semiconductor substrate.


REMARKS

This application is a divisional application of U.S. Patent Application Serial No. 09/411,139. Claims 1-30 have been canceled without prejudice. Claims 31-61 have been added for consideration.

The Examiner is requested to phone the undersigned if the Examiner believes such would facilitate prosecution of the present application. The undersigned is available for telephone consultation at any time during normal business hours (Pacific Time Zone).

Respectfully submitted,

Dated: 4/27/01

By: 
James D. Shaurette
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